

A 10-acre stadium enclosure highlights examples of aerospace spinoff in the field of construction

A Roof For The Lions' House

Fans of the National Football League's Detroit Lions don't worry about game-day weather. Their magnificent new Pontiac Stadium has a domed, air-supported, fabric roof that admits light but protects the playing field and patrons from the elements. The 80,000-seat "Silverdome" is the world's largest fabric-covered structure—and aerospace technology played an important part in its construction.

The key to economical construction of the Silverdome—and many other types of buildings—is a spinoff of fiber glass Beta* yarn coated with Teflon** TFE fluorocarbon resin. The big advance it offers is permanency. Fabric structures—tents, for example—have been around since the earliest years of human civilization. But their coverings—hides, canvas and more recently plastics—were considered temporary; though tough, these fabrics were subject to weather deterioration. Teflon TFE-coated Beta Fiberglas is virtually impervious to the effects of weather and sunlight and it won't stretch, shrink, mildew or rot, thus has exceptional longevity; it is also very strong, lightweight, flame resistant and requires no periodic cleaning, because dirt will not stick to the surface of Teflon TFE. And to top all that, it costs only 30 to 40 percent as much as conventional roofing. Coated fibrous

glass has sparked new interest in fabric structures; it is finding wide application as permanent roofing for a growing number of buildings ranging from a vocational school in wintry Alaska to a recreational facility amid the scorching sands of Saudi Arabia.

The material's origin dates to 1967, when NASA was looking for a new fabric for Apollo astronauts' space suits. It had to be durable and noncombustible, yet thin, light and flexible. Owens-Corning Fiberglas Corporation, Toledo, Ohio, had been experimenting with an ultra-fine glass fiber yarn called Beta yarn, which seemed to fill the bill. Under NASA contract, Owens-Corning wove the yarn into a fabric, coated it with Teflon TFE, manufactured by Du Pont Company, Wilmington, Delaware, and tailored it for astronaut wear. Later, to adapt the material to construction use, Owens-Corning thickened the yarn, Chemical Fabrics, Inc., Bennington, Vermont wove it into a stronger and more porous fabric, and applied a heavier coating of Teflon TFE. The three companies have teamed with the pioneer firm in air-supported structures—Birdair Structures, Inc., Buffalo, New York—to construct a variety of fabric-enclosed buildings, among them the Silverdome.

The Silverdome story illustrates why fiber glass Beta yarn coated with Teflon TFE has a bright future in the construction industry. The city of Pontiac, some 25 miles north of downtown Detroit, developed a plan to build an all-purpose stadium. The prime purpose was to provide a home for the Lions, but the Pontiac Stadium Authority wanted a year-round facility that could generate more income by housing such events as conventions, concerts, rodeos, circuses, and trade shows. Michigan's winter weather demanded an enclosed structure, but financing was limited and the cost of a steel-roofed stadium was prohibitive; New Orleans' Superdome, for example, had cost \$168 million. When architects and consulting engineers advanced the fabric dome idea and estimated a very low \$10 million roofing cost, Pontiac officials speedily adopted the plan. They budgeted \$56 million for total construction costs and, incredibly, completed the stadium slightly below that figure.

* Registered trademark, Owens-Corning Fiberglas Corporation

** Registered trademark, Du Pont Company

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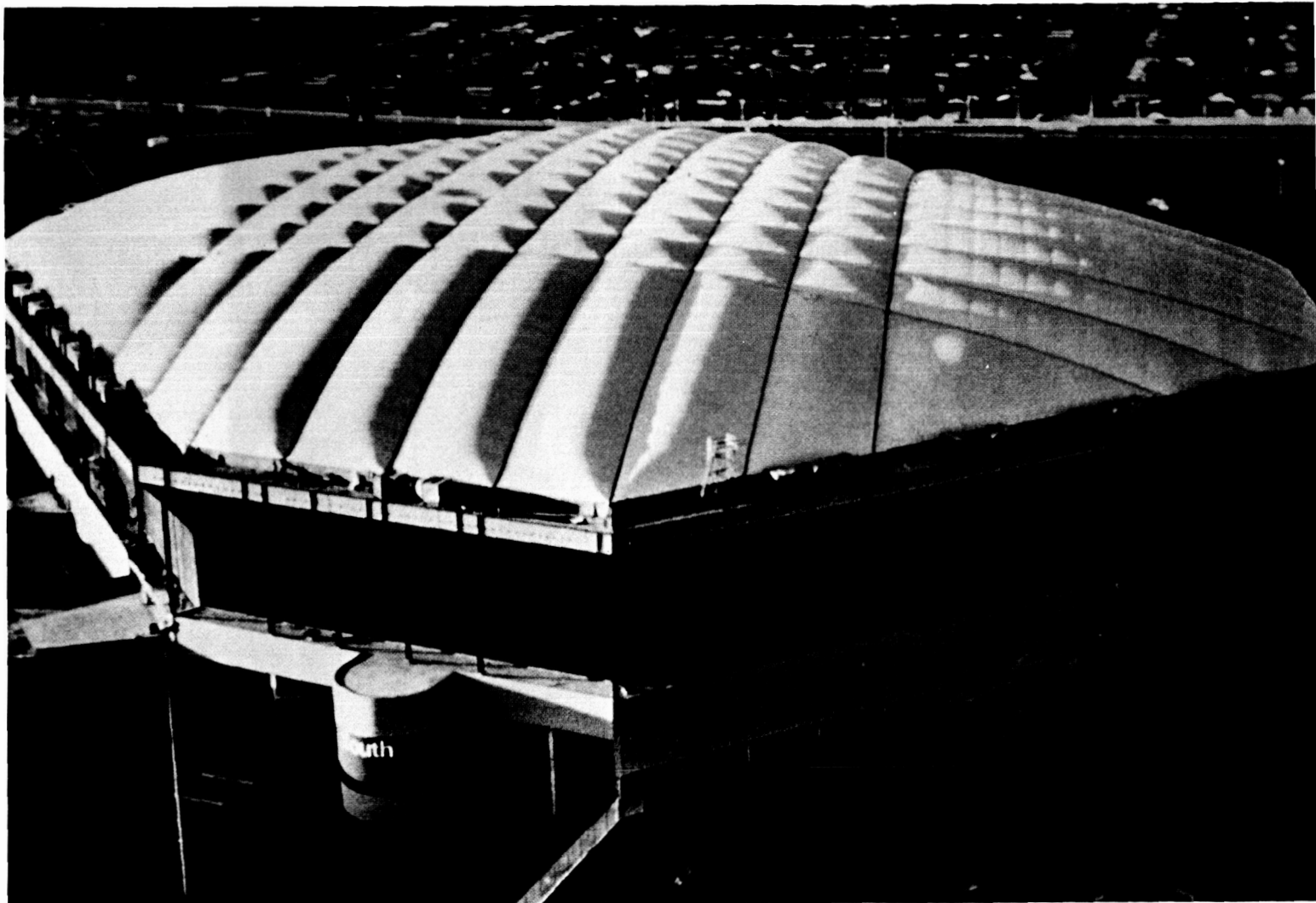
In construction, the 10-acre fabric envelope was stretched over a reinforcing network of steel cables anchored to a concrete ring running around the top of the stadium. To provide primary support, the envelope's compartments were inflated by 29 air-blowing fans; after initial inflation, only two or three fans are required to maintain pressure and the rest are used for ventilation. The completed fabric dome weighs only 200 tons, where a comparably-sized conventional roof would weigh about 6,000 tons. This

The Silverdome, home of the Detroit Lions at Pontiac, Michigan, has an air-supported, domed fabric roof for year-round utility. The coated fiber glass fabric is a strong, flame-resistant material originally developed for astronauts' space suits.

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is an economic bonus in addition to the basically low cost of fabric enclosure; the lighter weight means reduced load bearing requirements for the foundation, hence less steel and concrete.

The team of Owens-Corning, Du Pont, Chemical Fabrics and Birdair have collaborated on a number of fabric structures. Some are supported by air pressure, others by cables alone. Most of the structures are in the recreational category—stadia, athletic field houses, swimming pools, tennis courts—but the technique has also been used in schools, theaters, exhibit halls and industrial facilities. With conventional construction costs still on the upswing, you're likely to see a great many more permanent facilities enclosed by the aerospace spinoff fabric.

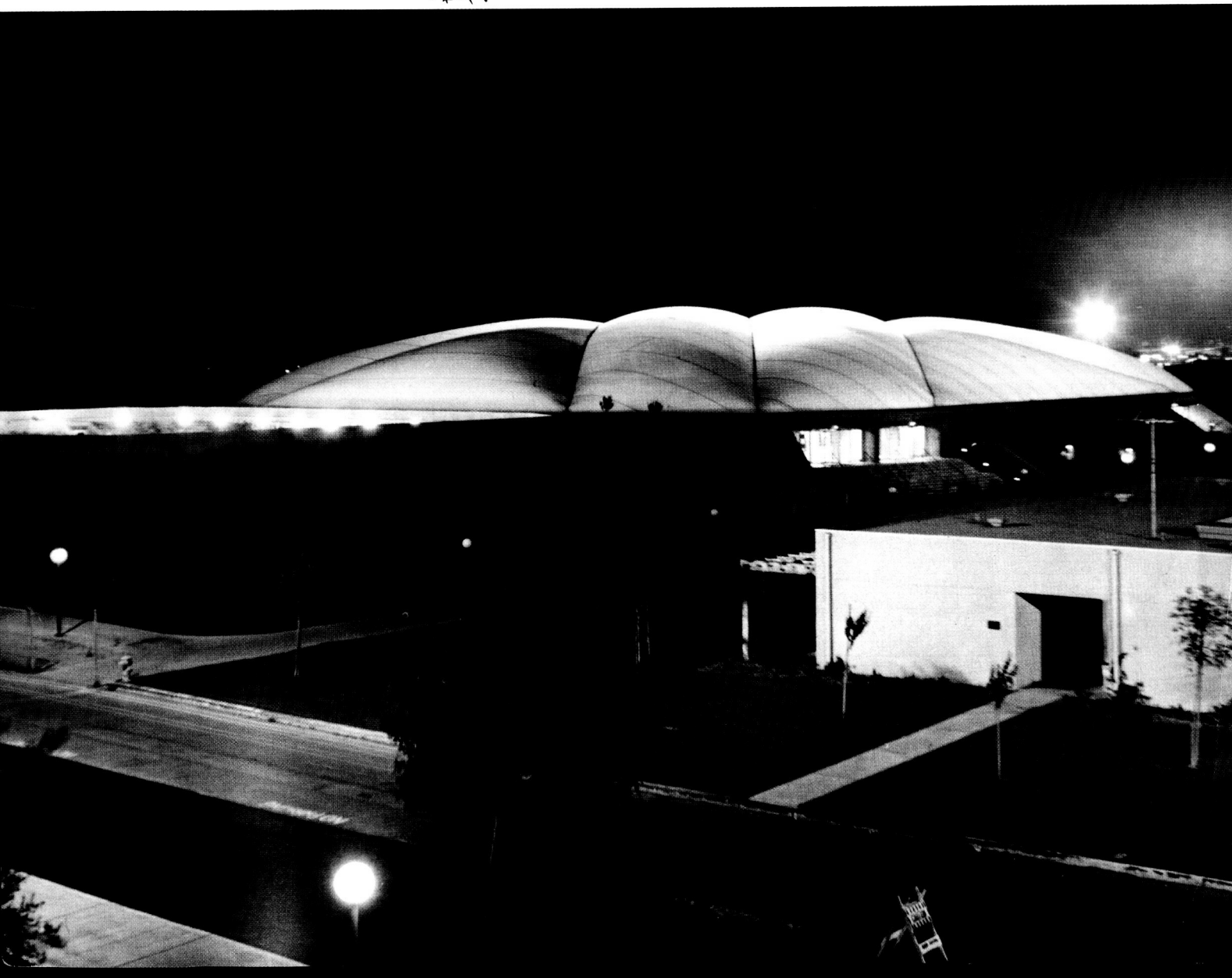


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The University of Santa Clara, California has a two-unit air-supported, fabric-covered facility. The larger structure is a 6,000-seat fieldhouse for athletic competitions and special events, the smaller houses a swimming pool.

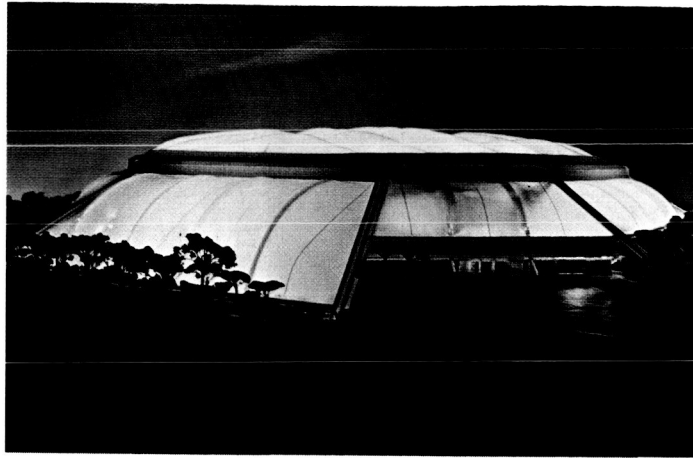
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Air-supported structures covered with coated fiber glass fabric—such as this activities center at the University of Florida, Gainesville—offer substantial savings in construction costs. Caudill Rowlett Scott are the design consultants. Moore May and Harrington of Gainesville, Florida are architects for this project.

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